

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re application of:	:	Atty. Docket No. EUR 50877/USw
Kuester Joern et al.	:	Examiner: John M. Cooney
Serial No.: 10/772,903	:	
Filed: February 5, 2004	:	Confirmation No.: 5357
For: PROCESS FOR MAKING	:	Group Art Unit: 1765
RIGID URETHANE-MODIFIED	:	
POLYISOCYANURATE FOAMS	:	

**APPEAL BRIEF**

September 28, 2011

MAIL STOP APPEAL BRIEF - PATENTS  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

In response to the Final Office Action dated June 10, 2011, the Appellants file this Appeal Brief with the Board of Appeals and Interferences.

## **BRIEF ON APPEAL**

### **REAL PARTY IN INTEREST**

The application has been assigned to Huntsman International LLC, The Woodlands, TX.

### **RELATED APPEALS AND INTERFERENCES**

No related appeals or interferences having a bearing on this patent case have been filed.

### **STATUS OF CLAIMS**

Claims 1-4, 9, 11, 18-19, 22-24, 26, 28, 30-31, and 35-42 are pending. Claims 1-4, 9, 11, 18-19, 22-24, 26, 28, 30-31, and 35-42 are rejected and appealed. Claims 5-8, 10, 12-17, 20-21, 25, 27, 29, 32-34 are cancelled.

### **STATUS OF AMENDMENTS**

A Non-Final Office Action was mailed on December 14, 2004. In response to this Office Action, the Appellants filed a response on February 22, 2005. A Final Office Action was mailed on May 9, 2005. In response to this Final Office Action, the Appellants filed a response on July 14, 2005.

Another Non-Final Office Action was mailed on July 25, 2005. In response to this Office Action, the Appellants filed a response on October 13, 2005. Another Final Office Action was mailed on January 1, 2006. In response to this Final Office Action, the Appellants filed a response on March 6, 2006. An Advisory Action was mailed on March 23, 2006. In response to the Advisory Action, the Appellants filed a response on April 18, 2006.

Another Non-Final Office Action was mailed on April 13, 2007. In response to this Office Action, the Appellants filed a response on September 12, 2007. Another Final Office was mailed on November 19, 2007. In response to this Final Office Action, the Appellants filed a response on February 19, 2008. Another Non-Final Office Action was mailed on March 27, 2008. In response to this Office Action, the Appellants filed a response on June 27, 2008. A Final Office Action was mailed on October 9, 2008. In response to the Final Office Action, the Appellants filed a response on April 7, 2009.

Another Non-Final Office Action was mailed on June 15, 2009. In response to this Office Action, the Appellants filed a response on October 15, 2009. Another Non-Final Office Action

was mailed on February 5, 2010. In response to this Office Action, the Appellants filed a response on May 28, 2010. A Final Office Action was mailed on August 20, 2010. In response to the Final Office Action, the Appellants filed a response on October 15, 2010. An Advisory Action was mailed on November 1, 2010. In response to the Advisory Action, the Appellants filed a response on November 18, 2010.

A Final Office Action was mailed on February 2, 2011. In response to this Final Office Action, the Appellants filed a response on March 30, 2011. A Final Office Action was mailed on June 10, 2011. In response to this Final Office Action, the Appellants filed a Notice of Appeal on September 12, 2011.

#### SUMMARY OF CLAIMED SUBJECT MATTER

Claim 1 recites: A process for preparing rigid urethane-modified polyisocyanurate foam (page 2, lines 1-2) comprising the step of reacting an organic polyisocyanate (page 6, lines 1-14) with a polyfunctional isocyanate-reactive component (page 5, lines 11-30) comprising at least 30 wt % of polyester polyols (page 5, lines 28-30) in the presence of a blowing agent, selected from the group consisting of water, an alkane, an alkene, a cycloalkane, or combinations thereof, and when the blowing agent is selected from an alkane, an alkene, or a cycloalkane, then the blowing agent consists of carbon and hydrogen atoms (page 6, line 15, to page 7, line 15), a urethane catalyst (page 4, lines 23-24), and a metal salt trimerisation catalyst (page 4, lines 7-22) characterized in that the process is carried out in the presence of a carboxylic acid that is functionalised with at least one OH, SH, NH<sub>2</sub>, NHR, NO<sub>2</sub> or halogen functional group and R is an alkyl, cycloalkyl or aryl group (page 2, line 30, to page 4, line 18), wherein the urethane catalyst is used in an amount ranging from 0.1 to 3.5 % by weight based on the isocyanate-reactive component (page 5, line 1) and the metal salt trimerisation catalyst is used in an amount ranging from 0.4 to 4.5 % by weight based on the isocyanate-reactive component (page 4, line 30).

Claim 2 recites: The process according to claim 1 wherein the carboxylic acid has a molecular weight below 250 (page 2, line 31).

Claim 3 recites: The process according to claim 1 wherein the carboxylic acid has a pKa value in water of between 1 and 5.5 (page 2, lines 3-5).

Claim 3 recites: The process according to claim 2 wherein the carboxylic acid has a pKa value in water of between 1 and 5.5 (page 2, lines 3-5).

Claim 9 recites: The process according to claim 1 wherein the carboxylic acid is functionalised in  $\alpha$  or  $\beta$  position with respect to the carboxyl group (page 2, line 8).

Claim 11 recites: The process according to claim 9 wherein said functionalised carboxylic acid corresponds to the general formula  $X_n - R'$  - COOH wherein X is OH, SH,  $NH_2$ , NHR,  $NO_2$  or halogen,  $R'$  is an at least divalent hydrocarbon moiety, n is an integer having a value of at least 1 and allows for mono and polyfunctional substitution on the hydrocarbon moiety (page 2, lines 10-14).

Claim 18 recites: The process according to claim 1 wherein said carboxylic acid is used in an amount ranging from 0.05 to 5 % by weight based on the isocyanate-reactive component (page 4, lines 5-6).

Claim 19 recites: The process according to claim 2 wherein said carboxylic acid is used in an amount ranging from 0.1 to 2 % by weight based on the isocyanate-reactive component (page 4, line 6).

Claim 22 recites: The process according to claim 1 wherein the metal salt trimerisation catalyst is an alkali metal salt of an organic carboxylic acid (page 4, lines 9-18).

Claim 23 recites: The process according to claim 2 wherein the metal salt trimerisation catalyst is an alkali metal salt of an organic carboxylic acid (page 4, lines 9-10).

Claim 24 recites: The process according to claim 23 wherein the metal salt trimerisation catalyst is potassium acetate or potassium 2-ethylhexanoate (page 4, line 11).

Claim 26 recites: The process according to claim 1 wherein the reaction is carried out at an isocyanate index of 150 to 450 % (page 5, line 3).

Claim 28 recites: A rigid urethane-modified polyisocyanurate foam (page 2, lines 1-2) obtained by reacting an organic polyisocyanate (page 6, lines 1-14) with a polyfunctional isocyanate-reactive component comprising at least 30 wt % of polyester polyols (page 5, lines 11-30) in the presence of a blowing agent, selected from the group consisting of water, an alkane, an alkene, a cycloalkane, or combinations thereof, and when the blowing agent is selected from an alkane, an alkene, or a cycloalkane, then the blowing agent consists of carbon and hydrogen atoms (page 6, line 15, to page 7, line 15), a urethane catalyst (page 4, lines 23-24), and a metal salt trimerisation catalyst characterized in that the process is carried out in the presence of a carboxylic acid functionalised with at least one OH, SH, NH<sub>2</sub>, NHR, NO<sub>2</sub>, or halogen functional group (page 2, line 30, to page 4, line 18), wherein R is an alkyl, cycloalkyl or aryl group, wherein the urethane catalyst is used in an amount ranging from 0.1 to 3.5 % by weight based on the isocyanate-reactive component (page 5, line 1) and the metal salt trimerisation catalyst is used in an amount ranging from 0.4 to 4.5 % by weight based on the isocyanate-reactive component (page 4, line 30).

Claim 30 recites: A process for preparing rigid urethane-modified polyisocyanurate foam (page 2, lines 1-2) comprising the step of reacting an organic polyisocyanate (page 6, lines 1-14) with a polyfunctional isocyanate-reactive component (page 5, lines 11-50) comprising at least 30 wt % of polyester polyols (page 5, lines 29-30) in the presence of a blowing agent (page 6, line 15, to page 7, line 15) and a metal salt trimerisation catalyst (page 4, lines 7-22) characterized in that the process is carried out in the presence of a functionalised carboxylic acid having at least one OH, SH, NH<sub>2</sub>, NHR, NO<sub>2</sub>, or halogen functional group, wherein R is an alkyl, cycloalkyl or aryl group (page 2, line 30, to page 4, line 18) and the metal salt trimerisation catalyst is used in an amount ranging from 0.5 to 5 % by weight based on the isocyanate-reactive component (page 4, line 29) and the functionalised carboxylic acid is used in an amount ranging from 0.1 to 2 % by weight based on the isocyanate-reactive component (page 4, line 6); and wherein the blowing agent is

selected from the group consisting of water, an alkane, an alkene, a cycloalkane, or combinations thereof, and when the blowing agent is selected from an alkane, an alkene, or a cycloalkane, then the blowing agent consists of carbon and hydrogen atoms (page 6, line 15, to page 7, line 15).

Claim 31 recites: The process according to claim 30 wherein water is present in an amount less than 1 % by weight based on the isocyanate-reactive component (page 7, lines 14-15).

Claim 35 recites: The process according to claim 28 wherein the carboxylic acid is functionalised in  $\alpha$  or  $\beta$  position with respect to the carboxyl group (page 2, line 8).

Claim 36 recites: The process according to claim 28 wherein the carboxylic acid corresponds to the general formula  $X_n - R' - COOH$  wherein X is OH, SH,  $NH_2$ , NHR,  $NO_2$  or halogen, R' is an at least divalent hydrocarbon moiety, n is an integer having a value of at least 1 and allows for mono and polyfunctional substitution on the hydrocarbon moiety page 2, lines 10-14).

Claim 37 recites: The process according to claim 1, wherein the blowing agent is selected from an alkane, an alkene, a cycloalkane, or combinations thereof (page 6, line 15, to page 7, line 15).

Claim 38 recites: The process according to claim 37, wherein the blowing agent is selected from the group of n-butane, iso-butane, 2,3-dimethylbutane, cyclobutane, n-pentane, iso-pentane, technical grade pentane mixtures, cyclopentane, methylcyclopentane, neopentane, n-hexane, iso-hexane, n-heptane, iso-heptane, cyclohexane, methylcyclohexane, 1-pentene, 2-methylbutene, 3-methylbutene, 1-hexene, and mixtures thereof (page 6, line 29, to page 7, line 8).

Claim 39 recites: The process according to claim 28, wherein the blowing agent is selected from an alkane, an alkene, a cycloalkane, or combinations thereof (page 6, line 15, to page 7, line 15).

Claim 40 recites: The process according to claim 39, wherein the blowing agent is selected from the group of n-butane, iso-butane, 2,3-dimethylbutane, cyclobutane, n-pentane, iso-pentane, technical grade pentane mixtures, cyclopentane, methylcyclopentane, neopentane, n-hexane, iso-hexane, n-heptane, iso-heptane, cyclohexane, methylcyclohexane, 1-pentene, 2-methylbutene, 3-methylbutene, 1-hexene, and mixtures thereof (page 6, line 29, to page 7, line 8).

Claim 41 recites: The process according to claim 30, wherein the blowing agent is selected from an alkane, an alkene, a cycloalkane, or combinations thereof (page 6, line 15, to page 7, line 15).

Claim 42 recites: The process according to claim 41, wherein the blowing agent is selected from the group of n-butane, iso-butane, 2,3-dimethylbutane, cyclobutane, n-pentane, iso-pentane, technical grade pentane mixtures, cyclopentane, methylcyclopentane, neopentane, n-hexane, iso-hexane, n-heptane, iso-heptane, cyclohexane, methylcyclohexane, 1-pentene, 2-methylbutene, 3-methylbutene, 1-hexene, and mixtures thereof (page 6, line 29, to page 7, line 8).

### **GROUND OF REJECTION TO BE REVIEWED ON APPEAL**

1. The rejection of Claims 1-4, 9, 11, 18-19, 22-24, 26, 28, 30-31, and 35-42 under 35 U.S.C. 103(a) in view of U.S. Patent No. 5,143,945 (hereinafter, referred to as "Bodnar").
2. The rejection of Claims 37-42 under 35 U.S.C. 103(a) in view of Bodnar and further in view of U.S. Patent No. 5,688,835 (hereinafter, referred to as "Scherbel").

### **ARGUMENT**

#### **Rejection of Claims 1-4, 9, 11, 18-19, 22-24, 26, 28, 30-31, and 35-42 under 35 U.S.C. 103(a):**

The Examiner has rejected independent Claims 1, 28, and 30 under 35 U.S.C. 103(a) for allegedly being unpatentable over Bodnar.

Claims 1, 28, 30 were amended to recite that the blowing agent that is used in the present invention is "selected from the group consisting of water, an alkane, an alkene, or a cycloalkane, or combinations thereof. Moreover, these claims were also amended to recite that "when the blowing agent is selected from an alkane, an alkene, or a cycloalkane, then the blowing agent consists of carbon and hydrogen atoms" (see the amended claims in the Appellants response dated November 18, 2010).

In general, Bodnar appears to disclose a rigid polyurethane-polyisocyanurate foam prepared from (a) polyisocyanates, (b) polyols, (c) trimer catalyst, and (d) a blowing agent mixture wherein the mixture contains (i) a halocarbon, (ii) an organic carboxylic acid, and, optionally, (iii) water (see Abstract). In other words, the presence of a halocarbon blowing agent is a required component (see component (i)) in the mixture. Moreover, Bodnar clearly states that the presence of the halocarbon blowing agent is the reason why his invention is novel and is, therefore, an essential and critical part of that invention:

The novelty in the present invention resides in the blowing agent mixture resides in the blowing agent mixture (c) to be employed with the urethane-isocyanurate forming ingredients. In its broadest scope the mixture comprises (i) a halocarbon blowing agent and (ii) an organic carboxylic acid (see column 3, lines 38-56).

As stated above, the blowing agents recited in the Claims 1, 28, and 30 of the present invention are selected from the group consisting of water, an alkane, an alkene, a cycloalkane, or combinations thereof. When the blowing agent is selected from an alkane, an alkene, or a

cycloalkane, then the blowing agent consists of carbon and hydrogen atoms. The Appellants, therefore, submit that none of the blowing agents recited in the present invention can be read to include the halocarbon blowing agent that is essential to Bodnar. For example, if the blowing agent of the present invention is selected from an alkane, alkene, or cycloalkane, then the blowing agent would only consist of carbon and hydrogen atoms. In other words, the blowing agent would not contain a halogen atom and would, therefore, not be consider a halocarbon compound.

Because Bodnar requires the use of a halocarbon blowing agent and because Bodnar explicitly states that the novelty of his invention is the use of a blowing agent mixture that comprises such a halocarbon blowing agent, the Appellants submit that Bodnar does not disclose every feature that is recited in the present invention. Accordingly, the Appellants respectfully submit that Claims 1, 28, and 30 are patentable over the cited reference. Moreover, the Appellants also submit that the claims that depend directly or indirectly from Claims 1, 28, and 30 are also patentable over Bodnar for the reasons stated above.

Rejection of Claims 37-42 under 35 U.S.C. 103(a)

The Examiner has rejected Claims 37-42 under 35 U.S.C. 103(a) for allegedly being unpatentable over Bodnar in view of U.S. Patent No. 5,688,835 (hereinafter, "Scherbel").

The Examiner asserts that it would have been obvious to one skilled in the art to have replaced the halocarbons of Bodnar with the hydrocarbons disclosed in Scherbel. The Appellants, however, submit that one skilled in the art would not make such a modification in view of the teachings of Bodnar and that the Examiner, therefore, has not properly set forth a *prima facie* case of obviousness.

The Examiner explained in the Final Office Action dated June 10, 2011 that it would have been obvious for one having ordinary skill in the art to have replaced the halocarbons of Bodnar with the hydrocarbons of Scherbel for the purposes of imparting the foaming effect with environmentally advantageous results in order to arrive at the products and processes of Appellants' claims (see page 4 of the Final Office Action).

In light of the explicit teaching of Bodnar, however, the Appellants must respectfully submit the Examiner's line of reasoning is mere speculation. For example, Bodnar explicitly states that the novelty of his invention lies in the presence of the halocarbon blowing agent (see Column 3, lines 38-40). Additionally, Bodnar clearly states that total replacement of halocarbon

blowing agents from the formulation disclosed therein will contribute to inferior physical properties of the end product (see Column 2, lines 8-30). Therefore, contrary to the Examiner's assertion, one skilled in the art would not be motivated to replace the halocarbon blowing agents of Bodnar with the hydrocarbon blowing agents of Scherbel and . In other words, there is no rationale to modify Bodnar as the Examiner has proposed.

As the Board is well aware, rejections based on 35 U.S.C. 103(a) must rest on a factual basis, not speculation, with the facts being interpreted without hindsight reconstruction of the invention from the prior art. See *In re Warner*, 379 F.2d 1011, 1017 (CCPA 1967). The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. MPEP 2143.01. *KSR* (82 USPQ.2d at 1396) highlights the importance of determining "whether there was an apparent reason to combine the known elements in the fashion claimed by [Applicant]."

Clearly, in this case, the combination of the cited references is improper due to the fact that Bodnar explicitly teaches away from the combination that the Examiner proposes and the proposed modification might lead to a material that is unsuitable for the purpose that the invention of Bondar was originally intended.

Because the Examiner has not properly set forth a *prima facie* case of obviousness and because neither Bodnar nor Scherbel discloses every feature that is recited in Claims 37-42, the Appellants submit that these claims, and the claims that depend therefrom, are patentable over the cited references.

Respectfully Submitted,

/Robert A. Diaz/

Robert A. Diaz  
Attorney for Appellants  
Reg. No. 55,109

Telephone No.: 281-719-4507  
Facsimile No.: 281-719-4045

Huntsman International LLC  
10003 Woodloch Forest Drive  
The Woodlands, TX 773802

## CLAIMS APPENDIX

1. A process for preparing rigid urethane-modified polyisocyanurate foam comprising the step of reacting an organic polyisocyanate with a polyfunctional isocyanate-reactive component comprising at least 30 wt % of polyester polyols in the presence of a blowing agent, selected from the group consisting of water, an alkane, an alkene, a cycloalkane, or combinations thereof, and when the blowing agent is selected from an alkane, an alkene, or a cycloalkane, then the blowing agent consists of carbon and hydrogen atoms, a urethane catalyst, and a metal salt trimerisation catalyst characterized in that the process is carried out in the presence of a carboxylic acid that is functionalised with at least one OH, SH, NH<sub>2</sub>, NHR, NO<sub>2</sub> or halogen functional group and R is an alkyl, cycloalkyl or aryl group, wherein the urethane catalyst is used in an amount ranging from 0.1 to 3.5 % by weight based on the isocyanate-reactive component and the metal salt trimerisation catalyst is used in an amount ranging from 0.4 to 4.5 % by weight based on the isocyanate-reactive component.
2. The process according to claim 1 wherein the carboxylic acid has a molecular weight below 250.
3. The process according to claim 1 wherein the carboxylic acid has a pKa value in water of between 1 and 5.5.
4. The process according to claim 2 wherein the carboxylic acid has a pKa value in water of between 1 and 5.5.

5-8. (Cancelled)

9. The process according to claim 1 wherein the carboxylic acid is functionalised in  $\alpha$  or  $\beta$  position with respect to the carboxyl group.

10. (Cancelled)

11. The process according to claim 9 wherein said functionalised carboxylic acid corresponds to the general formula  $X_n - R' - COOH$  wherein X is OH, SH,  $NH_2$ , NHR,  $NO_2$  or halogen, R' is an at least divalent hydrocarbon moiety, n is an integer having a value of at least 1 and allows for mono and polyfunctional substitution on the hydrocarbon moiety.

12-17. (Cancelled)

18. (Original) The process according to claim 1 wherein said carboxylic acid is used in an amount ranging from 0.05 to 5 % by weight based on the isocyanate-reactive component.

19. The process according to claim 2 wherein said carboxylic acid is used in an amount ranging from 0.1 to 2 % by weight based on the isocyanate-reactive component.

20-21. (Cancelled)

22. The process according to claim 1 wherein the metal salt trimerisation catalyst is an alkali metal salt of an organic carboxylic acid.

23. The process according to claim 2 wherein the metal salt trimerisation catalyst is an alkali metal salt of an organic carboxylic acid.

24. The process according to claim 23 wherein the metal salt trimerisation catalyst is potassium acetate or potassium 2-ethylhexanoate.

25. (Cancelled)

26. The process according to claim 1 wherein the reaction is carried out at an isocyanate index of 150 to 450 %.

27. (Cancelled)

28. A rigid urethane-modified polyisocyanurate foam obtained by reacting an organic polyisocyanate with a polyfunctional isocyanate-reactive component comprising at least 30 wt % of polyester polyols in the presence of a blowing agent, selected from the group consisting of water, an alkane, an alkene, a cycloalkane, or combinations thereof, and when the blowing agent is selected from an alkane, an alkene, or a cycloalkane, then the blowing agent consists of carbon and hydrogen atoms, a urethane catalyst, and a metal salt trimerisation catalyst characterized in

that the process is carried out in the presence of a carboxylic acid functionalised with at least one OH, SH, NH<sub>2</sub>, NHR, NO<sub>2</sub> or halogen functional group, wherein R is an alkyl, cycloalkyl or aryl group, wherein the urethane catalyst is used in an amount ranging from 0.1 to 3.5 % by weight based on the isocyanate-reactive component and the metal salt trimerisation catalyst is used in an amount ranging from 0.4 to 4.5 % by weight based on the isocyanate-reactive component.

29. (Cancelled)

30. A process for preparing rigid urethane-modified polyisocyanurate foam comprising the step of reacting an organic polyisocyanate with a polyfunctional isocyanate-reactive component comprising at least 30 wt % of polyester polyols in the presence of a blowing agent and a metal salt trimerisation catalyst characterized in that the process is carried out in the presence of a functionalised carboxylic acid having at least one OH, SH, NH<sub>2</sub>, NHR, NO<sub>2</sub>, or halogen functional group, wherein R is an alkyl, cycloalkyl or aryl group and the metal salt trimerisation catalyst is used in an amount ranging from 0.5 to 5 % by weight based on the isocyanate-reactive component and the functionalised carboxylic acid is used in an amount ranging from 0.1 to 2 % by weight based on the isocyanate-reactive component; and wherein the blowing agent is selected from the group consisting of water, an alkane, an alkene, a cycloalkane, or combinations thereof, and when the blowing agent is selected from an alkane, an alkene, or a cycloalkane, then the blowing agent consists of carbon and hydrogen atoms.

31. The process according to claim 30 wherein water is present in an amount less than 1 % by weight based on the isocyanate-reactive component.

32-34. (Cancelled)

35. The process according to claim 28 wherein the carboxylic acid is functionalised in  $\alpha$  or  $\beta$  position with respect to the carboxyl group.

36. The process according to claim 28 wherein the carboxylic acid corresponds to the general formula  $X_n - R' - COOH$  wherein X is OH, SH,  $NH_2$ , NHR,  $NO_2$  or halogen, R' is an at least divalent hydrocarbon moiety, n is an integer having a value of at least 1 and allows for mono and polyfunctional substitution on the hydrocarbon moiety.

37. The process according to claim 1, wherein the blowing agent is selected from an alkane, an alkene, a cycloalkane, or combinations thereof.

38. The process according to claim 37, wherein the blowing agent is selected from the group of n-butane, iso-butane, 2,3-dimethylbutane, cyclobutane, n-pentane, iso-pentane, technical grade pentane mixtures, cyclopentane, methylcyclopentane, neopentane, n-hexane, iso-hexane, n-heptane, iso-heptane, cyclohexane, methylcyclohexane, 1-pentene, 2-methylbutene, 3-methylbutene, 1-hexene, and mixtures thereof.

39. The process according to claim 28, wherein the blowing agent is selected from an alkane, an alkene, a cycloalkane, or combinations thereof.

40. The process according to claim 39, wherein the blowing agent is selected from the group of n-butane, iso-butane, 2,3-dimethylbutane, cyclobutane, n-pentane, iso-pentane, technical grade pentane mixtures, cyclopentane, methylcyclopentane, neopentane, n-hexane, iso-hexane, n-heptane, iso-heptane, cyclohexane, methylcyclohexane, 1-pentene, 2-methylbutene, 3-methylbutene, 1-hexene, and mixtures thereof.

41. The process according to claim 30, wherein the blowing agent is selected from an alkane, an alkene, a cycloalkane, or combinations thereof.

42. The process according to claim 41, wherein the blowing agent is selected from the group of n-butane, iso-butane, 2,3-dimethylbutane, cyclobutane, n-pentane, iso-pentane, technical grade pentane mixtures, cyclopentane, methylcyclopentane, neopentane, n-hexane, iso-hexane, n-heptane, iso-heptane, cyclohexane, methylcyclohexane, 1-pentene, 2-methylbutene, 3-methylbutene, 1-hexene, and mixtures thereof.

**EVIDENCE APPENDIX**

None

**RELATED PROCEEDINGS APPENDIX**

None.